

Application No. 10/024,244
Art Unit 1713
April 16, 2004
Reply to Office Action of November 17, 2003

REMARKS

Applicants respectfully request the Examiner to reconsider the present application in view of the foregoing amendments to the claims.

In the present Amendment, claims 1, 6, 10-13 and 17 have been amended. Claims 18-19 have been added. Claims 6-9 have allowable subject matter (see paragraph 7, page 4 of the Office Action). Thus, claims 1-19 are pending in the present application.

No new matter has been added by way of these amendments and new claims because each amendment and new claim is supported by the present specification. For example, the amendments to claims 1, 6 and 10 are supported by throughout the present specification. The amendment to claim 17 is editorial in nature. New claims 18-19 have support at page 7, lines 11-12 and the tables at page 6 of the present specification. Applicants note that claim 19 depends on allowable claim 6. Thus, no new matter has been added.

With regard to the term "random", Applicants respectfully submit that copolymers can be either random, block or graft. Among these, the block and graft copolymers are relatively specific types of copolymers. This is due in part because the graft copolymer is produced by graft-copolymerizing a monomer on a polymer that is previously prepared. Also, the block copolymer is produced by, for instance, by preparing an A-polymer block by the polymerization of an A-monomer, followed by

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polymerizing a B-monomer in order to produce the A-B block copolymer that is composed of the A-polymer block and the B-polymer block. As further evidence of Applicants' position, an excerpt from the *Textbook of Polymer Science* describing block and graft copolymers and their structures is enclosed. Applicants also enclose an excerpt from the Case Western University website (<http://plc.cwru.edu>) regarding the structures of block, graft and random copolymers.

In contrast to the graft and block types of copolymers, the random copolymer is not typically described as "random". The term "random" is omitted because the random copolymer is produced by simply polymerizing a mixture of two or more kinds of monomers. It is apparent to one skilled in this art that when there is no such description of the copolymer, then that polymer is a random copolymer (*i.e.*, a block copolymer is described as a block copolymer).

In this regard, Applicants respectfully submit that the present invention of the random copolymers has support throughout the present specification. First, Applicants do not describe "block" or "graft" copolymers in the present specification. Thus, one skilled in the art would understand, upon reading the present specification, that the Applicants contemplated random copolymers. Second, Applicants respectfully refer the Examiner to the Examples in the present specification (starting at page 17) which particularly show random

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copolymers and not block or graft copolymers (the structures of such block or graft copolymers can be seen in the *Textbook of Polymer Science* attachment). The Examples show that propylene and vinylcyclohexane were fed into an autoclave, wherein these monomers are mixed (for instance, see Example 1 at page 17, lines 7-11). Then the polymerization catalyst was prepared in the autoclave; in other words, the polymerization was initiated. With these Examples, one skilled in the art would understand that the copolymer produced is a random copolymer.

Therefore, Applicants respectfully submit that one skilled in the art would understand that the present inventors had possession of the claimed invention at the time the present application was filed. Consideration of the present invention as instantly claimed is respectfully requested. Further, based upon the above considerations, entry of the present amendment is respectfully requested.

Prior rejections have been withdrawn, and new objections/rejections are presented in the outstanding Office Action. In view of the following remarks, Applicants respectfully request that the Examiner withdraw all rejections and allow the currently pending claims.

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Claim Objections

Claims 14-17 have been objected to under 37 C.F.R. § 1.75(c) for improper dependency. Applicants respectfully traverse based on the following.

With regard to claims 14 and 16, Applicants respectfully refer the Examiner to the disputed claims as presented, wherein the straight chain α -olefin in claim 14 properly depends on the same in claim 6. With regard to claims 15 and 17, Applicants respectfully submit that the content of vinyl compound (I) in claim 6 is a value based on the total amounts of the α -olefin having 3 to 20 carbon atoms and the vinyl compound (I) of 100 mol%. Applicants note that the copolymer of claim 6 "contains" the vinyl compound and α -olefin. Therefore, the copolymer as an effective ingredient of claim 6 is not necessarily consisting of the α -olefin having 3 to 20 carbon atoms and the vinyl compound (I) as asserted in the Office Action.

Accordingly, Applicants respectfully submit that the disputed claims having proper dependency on the respective claim. Reconsideration and withdrawal of this objection are respectfully requested.

Issues under 35 U.S.C. § 112, Second Paragraph

Claim 17 stands rejected under 35 U.S.C. § 112, second paragraph, for reason of indefiniteness. Applicants respectfully traverse.

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Applicants respectfully refer the Examiner to the claim 17 as presented, wherein the laminate is recited. Accordingly, Applicants believe that this rejection is rendered moot, and reconsideration and withdrawal of the rejection are respectfully requested.

Issues under 35 U.S.C. §§ 102(b) and 103(a)

Claims 1-3 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Fuji et al. '810 (U.S. Patent No. 4,311,810). Also, claims 4, 5, 10-13 and 16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fuji '810. Applicants respectfully traverse, and reconsideration and withdrawal of these rejections are respectfully requested.

The cited Fuji '810 reference discloses a propylene copolymer having certain units, wherein the Examiner refers Applicants to Example A10 and parts of columns 1, 5 and 13 (see paragraphs 5-6 of the Office Action). However, the block copolymer of propylene and a branched α -olefin of Fuji '810 is a homo-polypropylene block and a random copolymer block of propylene and a branched α -olefin. In other words, the block copolymer as disclosed in Fuji '810 is not the random copolymer of the present invention.

In contrast to Fuji '810, the present invention is directed to a random copolymer consisting of units derived from propylene and units

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derived from a vinyl compound (I), wherein the vinyl compound (I) is represented by the general formula $\text{CH}_2=\text{CH}-\text{R}$ (i.e., see instantly pending claim 1). Thus, the copolymer of propylene and the vinyl compound (I) is a random copolymer of propylene and the vinyl compound (I), which is different from the copolymer of the cited Fuji '810 reference.

In this regard, Applicants respectfully submit that because "a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference," the cited Fuji '810 reference cannot be a basis for a rejection under § 102(b). See *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Thus, because of the lack of disclosure of all features as instantly claimed, the rejection in view of Fuji '810 is overcome. Reconsideration and withdrawal of this rejection is respectfully requested.

With regard to the rejection under § 103(a), Applicants respectfully submit that this rejection has been overcome as well. This is because a *prima facie* case of obviousness requires that the prior art reference (or references when combined) must teach or suggest all the claim limitations. See *In re Vaeck*, 947 F.2d, 488, 493, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991); see also *In re Kotzab*, 55 USPQ2d 1313, 1316-17 (Fed. Cir. 2000). Applicants submit that this requirement for a *prima*

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facie case of obviousness has not been satisfied since the cited Fuji '810 reference fails to even disclose the random copolymer as instantly claimed.

Applicants respectfully further submit that the Fuji '810 reference does not provide the requisite motivation or reasonable expectation of success. See *In re Vaeck*. This is no description or recognition in Fuji '810 so as to properly modify itself in order to achieve the formulations as instantly claimed in claims 4, 5, 10-13 or 16. For instance, one having ordinary skill in the art would understand that Fuji et al. intend to obtain block copolymers by adding a propylene homopolymer block to a random copolymer block of propylene and a branched α -olefin, such as vinyl cyclohexene for improving properties of a propylene homopolymer (see the Abstract; Col. 5, lines 17-18). This is quite different from the present invention. Further, any suggestion of vinylcyclohexane or a molded article in Fuji '810 is not with respect to a random copolymer as instantly claimed. This is an additional distinction. Applicants further submit that the disclosure at Col. 5, lines 17-18 are for "vinyl cyclohexene", and not for vinyl cyclohexane. Thus, this is an additional deficiency of Fuji '810.

Therefore, the Fuji '810 reference fails to disclose all features as instantly claimed, and one of ordinary skill in the art would not be motivated or reasonably expect to be successful in modifying this

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reference in order to achieve the present invention. Under *Verdegaal Bros.* or *Vaeck*, Applicants respectfully submit that the rejections in view of *Fuji '810* have been overcome. Accordingly, Applicants respectfully request the Examiner to reconsider, and to withdraw all rejections and allow the currently pending claims.

Conclusion

A full and complete response has been made to all issues as cited in the Office Action. Applicants have taken substantial steps in efforts to advance prosecution of the present application. Thus, Applicants respectfully request that a timely Notice of Allowance issue for the present case.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Eugene T. Perez (Reg. No. 48,501) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

Pursuant to 37 C.F.R. § 1.17 and 1.136(a), Applicants respectfully petition for a two (2) month extension of time for filing a response in connection with the present application. The required fee of \$450.00 is attached hereto.

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If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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Attachment: Excerpt from Textbook of Polymer Science, Fred W. Billmeyer, Jr., pp. 120-122 (1984 3rd Ed.)
Excerpt from Case Western University website for "Polymers and Liquid Crystals" (<http://plc.cwru.edu>)

TEXTBOOK OF POLYMER SCIENCE

THIRD EDITION

FRED W. BILLMEYER, JR.

*Professor of Analytical Chemistry
Rensselaer Polytechnic Institute, Troy, New York*

Best Available Copy

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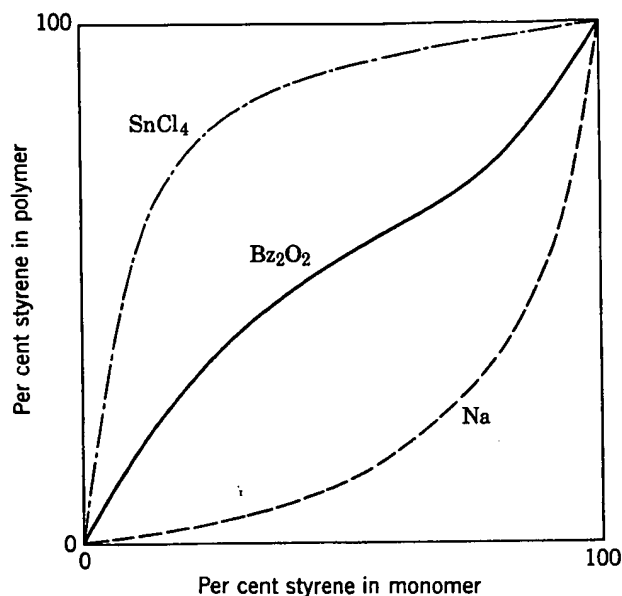


FIG. 5-9. Instantaneous composition of copolymer as a function of monomer composition for system styrene-methyl methacrylate polymerized by cationic (SnCl_4), free-radical (benz peroxide, Bz_2O_2), and anionic (Na) mechanisms (Landler 1950, Pepper 1954).

$\text{HOOC}(\text{CH}_2)_4\text{COOH}$, because of the proximity of the carboxyl groups in the former compound. For similar reasons, ethylene glycol and 1,4-butanediol have different esterification rates. Also, 1,3-butanediol differs in reactivity from 1,4-butanediol because one of the hydroxyl groups of the former is secondary, whereas both the latter are primary. Where such reactivity differences exist, the tendency is for the more reactive species to enter into the polymer first.

GENERAL REFERENCES

Ham 1964; Lenz 1967; Bamford 1976; Elias 1977, Chapter 22; Schulz 1979; Odell 1981, Chapter 6.

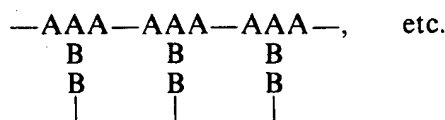
D. BLOCK AND GRAFT COPOLYMERS

It is shown in Section B that the probability of finding long sequences of one monomer in an ordinary random copolymer is very small, except in the trivial case where one monomer is present in large excess. Methods of synthesis of polymers containing such long sequences are of interest, however, since they may lead to polymers with properties widely different from those of either homopolymers or random copolymers (as discussed in Chapter 12). Polymers with long sequences

of two monomers can have two arrangements of chains: In *block copolymers* the sequences follow one another along the main polymer chain,



whereas in *graft copolymers* sequences of one monomer are “grafted” onto a “backbone” of the second monomer type,



The ultimate aim in preparing either type is to obtain the desired copolymer free from homopolymer or other unwanted species, on a scale that allows evaluation of physical properties. Few of the techniques described in the literature satisfy these requirements.

The industrial importance of both block and graft copolymers has increased markedly in recent years. These commercial polymers are discussed in Part 4.

Block Copolymers

Polymers With Labile End Groups. The usual method of preparing block copolymers utilizes a polymer with end groups that can be made to react under different conditions. In stepwise polymerization the method is trivially simple: Two polyesters, for example, of different type are separately prepared, mixed, and allowed to polymerize further. Ring-scission polymerization can be used effectively.

By means of free-radical techniques, block copolymers can be made in several ways. Labile end groups (as, for example, bromine incorporated through termination by transfer to CBr_4) can be activated by thermal or ultraviolet-light scission of the C—Br bond. Difunctional initiators can be used to produce block copolymers if the two initiator groups can be decomposed independently, or polymer radicals can be formed by milling or masticating the polymer. In each case, of course, the polymer radical must be produced in the presence of a second monomer to yield the copolymer.

By far the most important synthesis of block copolymers is that of Szwarc (1968a,b) for producing “living” polymers by unterminated anionic polymerization (Chapter 4C). Addition of a second monomer to the still active polymer leads to block copolymer uncontaminated with homopolymer and with blocks of accurately known and controlled length. The process can be repeated, with care, to produce multiblock polymers. Several commercial block copolymers are produced in this way and are discussed in Part 4; see also Fetters (1969).

Graft Copolymers

Graft copolymerization results from the formation of an active site at a point on a polymer molecule other than its end, and exposure to a second monomer. Most graft copolymers are formed by radical polymerization. The major activation reaction is chain transfer to polymer (Chapter 3). In many instances the transfer reaction involves abstraction of a hydrogen atom. An important commercial application is the grafting of polystyrene or styrene-acrylonitrile copolymer onto butadiene or acrylonitrile-butadiene copolymer rubber in the production of ABS resins (Chapter 14A). Ultraviolet or ionizing radiation, or redox initiation, among other methods, can also be used to produce the polymer radicals leading to graft copolymers.

GENERAL REFERENCES

Burlant 1960; Hoffman 1964; Ceresa 1965, 1973, 1976; Battaerd 1967; Aggarw 1970; Allport 1973; Noshay 1977; Morton 1977; Schildknecht 1977.

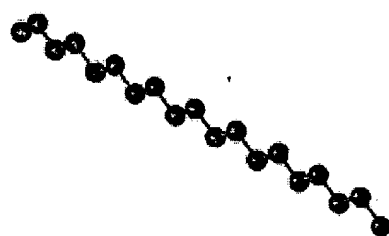
DISCUSSION QUESTIONS AND PROBLEMS

1. Define the reactivity ratios r_1 and r_2 , and indicate their values for (a) ideal, alternating, and (c) azeotropic copolymerization.
2. Derive the copolymer equation, stating the assumptions used.
3. Discuss the chain structures obtained in alternating, random, block, and graft copolymers.
4. Consider the copolymerization of methyl acrylate (1) and vinyl chloride. The following compositions were found:

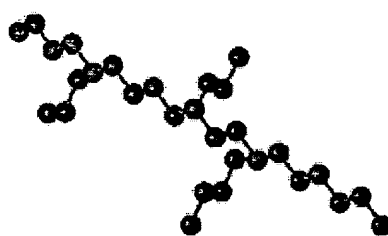
Mole Percent Methyl Acrylate in Feed	Mole Percent Methyl Acrylate in Polymer
7.5	44.1
15.4	69.9
23.7	75.3
32.6	82.8
42.1	86.4
52.1	90.0
74.4	96.8
86.7	98.3

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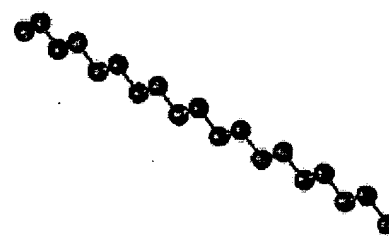
A separate kind of chain structure arises when more than one type of monomer is involved in the synthesis reaction. These polymers that incorporate more than one kind of monomer into their chain are called copolymers. There are three important types of copolymers. A random copolymer contains a random arrangement of the multiple monomers. A block copolymer contains blocks of monomers of the same type. Finally, a graft copolymer contains a main chain polymer consisting of one type of monomer with branches made up of other monomers. The following diagram displays the different types of copolymers.



Block Copolymer

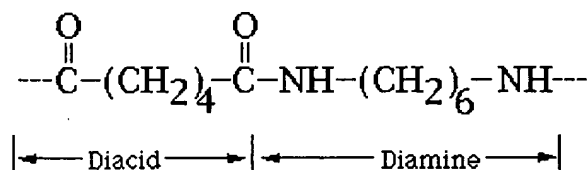


Graft Copolymer



Random Copolymer

An example of a common copolymer is Nylon. Nylon is an alternating copolymer with 2 monomers, a 6 carbon diacid and a 6 carbon diamine. The following picture shows one monomer of the diacid combined with one monomer of the diamine:



Cross-Linking

In addition to the bonds which hold monomers together in a polymer chain, many polymers form bonds between neighboring chains. These bonds can be formed directly between the neighboring chains, or two chains may bond to a third common molecule. Though not as strong or rigid as the bonds within the chain, these cross-links have an important effect on the polymer. Polymers with a high enough degree of